
NI-9203

Specifications

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NI-9203 Specifications

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- **Typical** specifications describe the performance met by a majority of models.
- **Nominal** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are **Typical** unless otherwise noted.

Related information:

- [Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT](#)

Conditions

Specifications are valid for the range -40 °C to 70 °C unless otherwise noted. All voltages are relative to COM unless otherwise noted.

Connector Types

The NI-9203 has more than one connector type: NI-9203 with screw terminal and NI-9203 with spring terminal. Unless the connector type is specified, NI-9203 refers to all connector types.

Input Characteristics

Number of channels	8 analog input channels
ADC resolution	16 bits
Type of ADC	Successive approximation register (SAR)
Nominal input	
Unipolar	0 mA to 20 mA
Bipolar	± 20 mA
Minimum overrange	
Unipolar	6.5%
Bipolar	5.5%
Overvoltage protection, channel-to-COM	± 30 V maximum on one channel at a time
Sample rate	
R Series Expansion chassis	192 kS/s maximum
All other chassis	200 kS/s maximum
Conversion time	
R Series Expansion chassis	5.2 μ s minimum
All other chassis	5 μ s minimum

Table 1. Unipolar Accuracy

	Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range ^[1] (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	±0.18%	±0.06%
	Typical (25 °C, ±5 °C)	±0.04%	±0.02%
Uncalibrated	Maximum (-40 °C to 70 °C)	±0.66%	±0.54%
	Typical (25 °C, ±5 °C)	±0.49%	±0.46%

Table 2. Bipolar Accuracy

	Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range ^[1] (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	±0.20%	±0.09%
	Typical (25 °C, ±5 °C)	±0.05%	±0.02%
Uncalibrated	Maximum (-40 °C to 70 °C)	±0.74%	±0.66%
	Typical (25 °C, ±5 °C)	±0.54%	±0.55%

Scaling coefficients

Unipolar	330 nA/LSB typical
Bipolar	660 nA/LSB typical

Unipolar stability

Offset drift	63 nA/°C
Gain drift	±14 ppm/°C

Bipolar stability

Offset drift	286 nA/°C
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Gain drift	± 17 ppm/ $^{\circ}$ C
Input bandwidth (-3 dB)	850 kHz
Input impedance	
Resistance	138 Ω
Capacitance	20 pF
Input noise (code-centered)	
RMS	1 LSB RMS
Peak-to-peak	7 LSB
No missing codes	16 bits
INL	± 3 LSB maximum
Crosstalk (at 1 kHz)	-100 dB
Settling time (to 2 LSB)	5 μ s
MTBF	1,522,814 hours at 25 $^{\circ}$ C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method

Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	± 30 V DC maximum
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Isolation Voltages

Channel-to-channel	None
Channel-to-earth ground up to 2,000 m altitude	
Continuous	250 V RMS, Measurement Category II
Withstand	2,300 V RMS, verified by a 5 s withstand test
Channel-to-earth ground up to 5,000 m altitude	
Continuous	60 V DC, Measurement Category I
Withstand	1,000 V RMS, verified by a 5 s withstand test

Measurement Category

Measurement Category I



Caution Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV.



Attention Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

Warning Do not connect the product to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINS circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage

and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.

Mise en garde Ne pas connecter le produit à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions transitoires supérieures à ce que le produit peut supporter. Le produit ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous peine d'endommager et de compromettre l'isolation. Le produit peut tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as **MAINS** voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Measurement Category II



Caution Do not connect the product to signals or use for measurements within Measurement Categories III or IV.



Attention Ne pas connecter le produit à des signaux dans les catégories de mesure III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet, for example, 115 V for U.S. or 230 V for Europe.

Environmental Characteristics

Temperature	
Operating	-40 °C to 70 °C
Storage	-40 °C to 85 °C
Humidity	
Operating	10% RH to 90% RH, noncondensing
Storage	5% RH to 95% RH, noncondensing
Ingress protection (with power plug attached)	IP40
Pollution Degree	2
Maximum altitude	5,000 m

Shock and Vibration	
Operating vibration	
Random	5 g RMS, 10 Hz to 500 Hz
Sinusoidal	5 g, 10 Hz to 500 Hz
Operating shock	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

To meet these shock and vibration specifications, you must panel mount the system.

Power Requirements

Power consumption from chassis	
Active mode	399 mW maximum
Sleep mode	5 mW maximum
Thermal dissipation (at 70 °C)	
Active mode	1.22 W maximum
Sleep mode	824 mW maximum

Physical Characteristics

Weight	
NI-9203 with screw terminal	162 g (5.7 oz)
NI-9203 with spring terminal	150 g (5.3 oz)

Dimensions	Visit ni.com/dimensions and search by product name
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NI-9203 with Screw Terminal

Screw terminal wiring	
Gauge	0.2 mm ² to 2.5 mm ² (26 AWG to 14 AWG) copper conductor wire
Wire strip length	13 mm (0.51 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Torque for screw terminals	0.5 N · m to 0.6 N · m (4.4 lb · in. to 5.3 lb · in.)
Wires per terminal	One wire per screw terminal; two wires per screw terminal using a 2-wire ferrule
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

NI-9203 with Spring Terminal

Spring terminal wiring	
Gauge	0.2 mm ² to 2.5 mm ² (24 AWG to 12 AWG) copper conductor wire

Wire strip length	10 mm (0.39 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Wires per terminal	One wire per spring terminal; two wires per spring terminal using a 2-wire ferrule
Ferrules	0.25 mm ² to 2.5 mm ²
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

Calibration

You can obtain the calibration certificate and information about calibration services for the NI-9203 at ni.com/calibration.

Calibration interval	1 year
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